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D. E. Madsen

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# Sinusitis of Turkeys

## AND ITS TREATMENT

by

D. E. MADSEN

AGRICULTURAL EXPERIMENT STATION
UTAH STATE AGRICULTURAL COLLEGE
LOGAN, UTAH

## SUMMARY

1. Sinusitis causes considerable loss yearly in the turkey industry in Utah. The symptoms consist of a watery discharge from the nostrils and eyes followed by a swelling of the face as a result of inflammation and accumulation of mucus in the sinuses.

2. The loss from this disease is occasioned through a pronounced reduction in weight gains of turkeys rather than a high mortality loss.

3. Limited trials showed the disease could be transmitted by inoculation with sinus exudates.

4. Vaccines did not prove successful in control of the disease.

5. Silver-nitrate solution was found far superior to other medicaments as a treatment. Four-percent solution gave slightly better results than 2 percent.

6. The syringe method of draining and treating the sinus was found superior to the knife method.

# Sinusitis of Turkeys and Its Treatment[1]

D. E. MADSEN[2]

## Description of the Disease

Sinusitis has long been recognized as one of the barriers to profitable production of chicken products; and with the growth in commercial turkey production in the west its existence in this bird has become increasingly significant. In Utah areas considerable loss is encountered yearly from this disease in turkeys. This loss has prompted some investigations as to what measures may be adopted for its control.

The first symptom noted is a watery discharge from the nostrils and eyes and the affected bird shakes its head in an effort to dislodge accumulations of mucus in the nasal passages. There next developes a swelling of the face just below and in front of the eye as a result of inflammation of the infraorbital sinus and the accumulation of mucus in that sinus. One or both sides of the face may become affected. It was found in one flock where 197 turkeys were affected that 72 percent of the birds had one side only affected while 28 percent had involvement of both sinuses. The swellings may vary from slight to nearly the size of a hen's egg.

Observation on 142 birds affected on one side only showed that in 9 percent of the cases the disease spread to the other side over a period ranging from 2 to 8 weeks.

Sinusitis as seen in the turkey differs from that in the chicken in that the accumulated exudate consists of a slightly turbid or yellowish mucus which has a tendency to remain in a liquid state indefinitely. In the chicken the fluid exudate soon becomes semi-solid and cheesy. According to the author's records, after a few weeks duration, in approximately 10 percent of turkey sinusitis cases, the mucus became cheesy. Sinusitis in turkeys does not interfere with respiration to the extent encountered in chickens. The inflammatory reaction is confined to the sinuses and tissues surrounding the eye with little or no involvement of the mouth and larynx; this results in a low mortality. The economic loss results from low gains which in turn are probably caused by head pains, being bossed by other birds, and, in some cases, interference with eye sight.

In this study, 210 turkeys affected in various degrees with sinusitis

[1]Contribution from the Department of Animal Pathology, Utah Agricultural Experiment Station. Project 156. Hatch.

[2]Research professor of animal pathology.

Authorized for publication.

were rechecked 25 days later, and 20 percent apparently recovered or at least their involvement was not sufficient to be readily recognized. There is reason to believe, however, that these recovered birds were only mildly affected when first noted. Where definite identification of birds has been made, the spontaneous recovery with medium to pronounced sinus swelling has been extremely rare.

## The Effect of Sinusitis on Weight Gains

Mention has already been made that the loss from sinusitis in turkeys is not the result of an appreciable amount of mortality but rather from an inhibition of growth and fattening. An opportunity to study the influence of sinusitis on the weight gains was afforded when the disease occurred among turkeys on a feeding experiment conducted by the Poultry Department of the Utah Agricultural Experiment Station. The birds were weighed at weekly intervals but for the purpose of this study the weights of the affected birds are given only during the period they showed sinusitis symptoms (see table 1). Most of the cases occurred in pen 2. An equal number of birds from the same pen, not

Table 1—*Weights and gains of disease-free turkeys and turkeys affected with sinusitis between October 30 and November 20*

| Sex | Bird no. | Weight | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Oct. 30 *lbs.* | Nov. 6 *lbs.* | Gain *lbs.* | Nov. 13 *lbs.* | Gain *lbs.* | Nov. 20 *lbs.* | Gain *lbs.* |
| Pen 2—Birds affected with sinusitis | | | | | | | | |
| Hen | 222 | 9.3 | 9.5 | .2 | 9.9 | .4 | 10.3 | .4 |
| Hen | 225 | 9.4 | 9.1 | —.3* | 8.8 | —.3* | 8.8 | .0 |
| Hen | 226 | 10.7 | 11.1 | .4 | 11.5 | .4 | 11.4 | —.1* |
| Hen | 227 | 12.8 | 12.8 | .0 | 13.1 | .3 | 13.2 | .1 |
| Tom | 234 | 14.9 | 15.4 | .5 | 16.1 | .7 | 16.8 | .7 |
| Tom | 537 | 14.1 | 14.4 | .3 | 15.3 | .9 | 15.9 | .6 |
| Hen | 224 | 8.5 | 8.5 | .0 | 9.0 | .5 | 9.0 | .0 |
| Hen | 232 | | | | 11.6 | | 11.9 | .3 |
| Tom | 520 | | 16.1 | | 15.2 | —.9* | 16.8 | 1.6** |
| Tom | 531 | | | | 18.1 | | 18.3 | .2 |
| Tom | 532 | | | | 14.8 | | 15.3 | .5 |
| Hen | 523 | 11.1 | 11.5 | .4 | 12.3 | .8 | 12.6 | .3 |
| Average weekly gain | | | | .19 | | .32 | | .38 |
| Pen 2—Birds not affected with sinusitis | | | | | | | | |
| Hen | 228 | 11.1 | 11.3 | .2 | 11.7 | .4 | 12.1 | .4 |
| Hen | 233 | 9.3 | 9.5 | .2 | 10.1 | .6 | 10.4 | .3 |
| Hen | 236 | 8.6 | 8.8 | .2 | 9.2 | .4 | 9.2 | .0 |
| Hen | 240 | 8.6 | 9.0 | .4 | 9.6 | .6 | 9.6 | .0 |
| Hen | 369 | 9.1 | 9.5 | .4 | 10.0 | .5 | 10.3 | .3 |
| Hen | 526 | 12.5 | 13.2 | .7 | 13.9 | .7 | 14.3 | .4 |
| Hen | 536 | 11.4 | 11.7 | .3 | 12.3 | .6 | 12.4 | .1 |
| Tom | 535 | 14.9 | 15.8 | .9 | 16.1 | .3 | 16.8 | .7 |
| Tom | 534 | 15.4 | 15.5 | .1 | 16.6 | 1.1 | 17.0 | .4 |
| Tom | 529 | 14.7 | 15.6 | .8 | 16.2 | .6 | 16.6 | .4 |
| Tom | 231 | 16.2 | 16.8 | .6 | 17.6 | .8 | 18.3 | .7 |
| Tom | 519 | 15.3 | 15.6 | .3 | 16.4 | .8 | 17.4 | 1.0 |
| Average weekly gain | | | | .57 | | .62 | | .39 |

*Indicates loss rather than gain in these cases.

**This bird treated November 7.

affected with sinusitis was selected at random for controls. It will be noted that during the first two weeks of the disease there was a decided drop in weight gain in the diseased birds as compared with the healthy birds. There was practically no difference in gain between the two groups the week just before slaughter, November 13 to November 20. Five cases of sinusitis in pens 4 and 5 developed as late as approximately November 13 and their average weekly gain for the week November 13 to November 20 was 0.48 pound as compared with 0.81 pound for 11 disease-free controls in the same pen.

It is noted in table 1 that bird no. 520 lost weight the first week in which weight was recorded but the following week it gained considerably more than the average gain. This bird was treated with 4 percent silver-nitrate solution on November 7. The combined treatment and existing pathology apparently contributed to this weight loss, but the second week following treatment the weight loss was rapidly regained This was the only bird treated in pen 2 during the course of the experiment.

The study shows a combined weight gain of affected turkeys of 57 percent less than that made by the healthy birds during the first two weeks of affliction.

This gives evidence that low rate of weight gain is associated with sinusitis. Compared with controls in the same pen the gain of sinusitis birds dropped two-thirds the first week of the disease, one-half the second week, and gained approximately the same as the controls in the third week.

The above experience would suggest that the disease exerts its greatest influence in retarding gains during the first two weeks, although it is conceivable that the birds of the healthy group had nearly reached their maximum growth by November 13 while the birds retarded by sinusitis had not yet reached the point in growth and finish where the rate of gain would naturally be reduced.

Table 2 shows that birds in thin flesh as a result of sinusitis make rapid gains once a cure is effected. Gains remain low and the individuals remain in thin flesh as long as the sinus remain swollen.

## Causes of the Disease

Hinshaw[3] notes that etiologically, there are two types of sinusitis in turkeys, infectious and nutritional. Each is indistinguishable from the other so far as the sinus involvement is concerned. The one type has been definitely shown by him to be caused by a low intake of vitamin

[3]Hinshaw, W. R. Diseases of turkeys. Calif. Agr. Exp. Sta. Bul. 613. 1937.

Table 2—*The effect of treatment on weight gains (pounds)*

| No. of bird | Condition of sinus before treatment* | Date of treatment | Technique of treatment | Date of examination | | | | | Net gain in weight (23 days) | Average weekly gain per bird in each group |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 11-25 | 11-27 | 12-1 | 12-4 | 12-18 | | |
| 225 | Both 4X | 11-25-36 | Incision 2 gr. calomel | 9.1 | Soft swelling 7.9 | Slight soft swelling 7.6 | Slight soft swelling 8.6 | Both 2X 10.2 | *pounds* 1.1 | *pounds* |
| 508 | Right 3X | " | " | 22.2 | Soft swelling 22.7 | 3X 22.6 | 3X 22.9 | 3X 24.1 | 1.9 | |
| 599 | Both 3X | " | " | 18.0 | Soft swelling 16.6 | Both IX 17.8 | Both 2 X 18.3 | Left 4X Right 2X 18.3 | 0.3 | |
| 546 | Left 4X | " | " | 15.5 | Soft swelling 15.9 | 4X 16.1 | 4X 16.1 | 4X 16.5 | 1.0 | .33 |
| 226 | Left 4X | " | Syringe 1cc. silver nitrate sol. | 11.5 | Soft swelling 11.5 | Hard swelling 11.8 | Hard swelling 12.1 | Recovered slight mucus 13.9 | 2.4 | |
| 571 | Both 2X | " | " | 9.2 | Soft swelling 9.6 | Recovered 9.5 | 9.7 | 10.7 | 1.5 | |
| 224 | Right 2X | " | " | 9.2 | Hard swelling 9.0 | Hard swelling 9.0 | Hard swelling 2X 9.0 | 10.3 | 1.1 | |
| 234 | Left 4X | " | " | 17.6 | Hard swelling 17.6 | Hard swelling 18.0 | Hard swelling 18.4 | Recovered Hard swelling slight mucus 20.0 | 2.4 | |
| 575 | Both 4X | " | " | 14.9 | Hard swelling 15.5 | Hard swelling 15.6 | Recovered 15.9 | 17.6 | 2.7 | .89 |

*"Both," "left," or "right" refers to the sinuses affected. X refers to the degree of involvement, 4X being pronounced involvement and 1X denoting lesser involvement. 2X and 3X are respective graduations.

A. The epidemiology of some outbreaks in the presence of adequate vitamin A strongly suggests a specific infective agent to be a causitive factor, also.

Beach et al[4] have shown that the organism causing coryza of chickens (*Hemophilus gallinarum*) can produce characteristic sinusitis when inoculated into turkeys. Whether this organism or other infective agents are the cause of infectious sinusitis of turkeys as found in the field is not definitely determined.

Approximately one-half of the turkeys in which outbreaks investigated by the author have occurred have been on rations in which the vitamin-A content was kept near or below the minimum requirement which is reported by Hinshaw and Lloyd[5]. It seems quite likely that in some outbreaks a low level of vitamin A., although not deficient enough to produce the classical pustules seen in vitamin-A deficiency, nevertheless predisposes and weakens the mucus membrane lining the sinuses and air passages of the head to the extent that it becomes vulnerable for the specific infective agent. Intense inflammation with the production of mucus finally results in the swollen condition of the infraorbital sinuses.

Although the object of this experiment was not to determine the etiology of sinuistis in turkeys an opportunity was provided to inject some exudate removed from the sinuses of affected turkeys into the sinuses of 6 turkeys. In from 1 to 10 days symptoms of sinusitis developed. This same material injected into 2 chickens failed to produce the disease. When some of the exudate material was passed through a Berkefeld filter it did not produce the disease in 2 turkeys and 1 chicken. Two healthy turkeys confined in a small cage with a turkey affected with sinusitis did not develop the disease after 6 weeks of such exposure. The fact that the disease is quite readily transmitted from one turkey to another by intrasinal inoculations would suggest an infective agent to be responsible, at least in part. Although the disease appears to be contageous it apparently is not highly so because it was not readily contracted on close contact in cages.

## Vaccination as a Preventive and Therapeutic Measure

Since a considerable amount of vaccination is done each year in an effort to prevent or control this disease it was thought advisable to con-

[4]Beach, J. R., and Schalm, O. W. Studies of the clinical manifestation and transmissibility of infectious coryza of chickens. Poultry Science 15:466-72. 1936.

[5]Hinshaw, W. R. and Lloyd, W. E. Vitamin-A deficiency in turkeys. Hilgardia 8:281-304. September 1934.

duct some field trials, with controls provided, so that some measurement of results could be made. In flock no. 1 where some of these trials were carried out, sinusitis occurred at about 8 weeks of age, soon after the poults were placed out on alfalfa range. There was a history of coryza among chickens kept on this same ranch. Sinusitis had been spreading in this flock of turkeys for 3 weeks prior to the time this study began. The birds under test were identified by colored spiral leg bands and by toe punches. On final examination, a number of the bands had been lost, consequently the results were measured only on the basis of those birds which could definitely be identified. The birds in this flock all ranged together and therefore presumably had uniform environment and exposure. They were examined 25 days after vaccination.

Flock no. 2, located at the Utah State Agricultural College, consisted of 326 turkeys divided into 8 pens with lath sun porches. These birds were cared for by attendants who also attended chickens which have at times exhibited a few cases of coryza. No opinion is offered as to whether or not such association was a factor in causing the outbreak of sinusitis. A few cases of sinusitis developed in turkeys reared in those pens the previous year. The pens were thoroughly cleaned and disinfected before the group of birds under discussion was admitted.

Vaccination in both flocks consisted of injecting 1 cc. of roup bacterin[6] under the skin. This was followed in 2 days with 2 cc. The results of these trials are shown in table 3.

Table 3—*Percent of vaccinated and non-vaccinated turkeys developing and recovering from sinusitis*

| | Flock no. 1 | | Flock no. 2 | |
|---|---|---|---|---|
| | Vaccinated | Not vaccinated | Vaccinated | Not vaccinated |
| Original healthy turkeys | | | | |
| Number | 312 | 596 | 163 | 163 |
| Percent developing sinusitis | 19 | 24 | 8 | 6.7 |
| Affected turkeys | | | | |
| Number | 187 | 210 | | |
| Percent recovered | 32 | 20 | | |

While the use of roup bacterin in flock no. 1 seemed to convey some protective properties and the therapeutic properties conveyed were slightly more noticeable, the figures are not of sufficient magnitude to warrant much enthusiasm. When the cost of the vaccine and the disturbance incident to vaccination of the birds are taken into considera-

[6]This product was obtained from a commercial biological supply house and contained *Staphylococcus albus* 40 percent, *S. aureus* 40 percent, and *Pasteurella avicida* 20 percent.

tion, the vaccine does not appear to offer much, if any, relief. The trials with flock no. 2 showed no protective properties for the vaccine, althought consideration must be given to the fact that the outbreak came nearly 3 months after vaccination. After this lapse of time any immunity developed in the vaccinated birds may have been lost.

## Treatment of Affected Birds

A series of preliminary experiments with 40 turkeys affected with sinusitis and kept in exhibit cages at the laboratory, were conducted in an effort to determine the efficacy of draining the sinus and introducing various types of medicaments. Those used included 1 cc. of 8 percent, 4 percent and 2 percent silver-nitrate solutions, 2 gr. to 4 gr. calomel tablets, powdered calomel, 1 cc. to 2 cc. of a 20 percent argyrol solution (neo silvol), 1 cc. tincture of metaphen, 1 cc. tincture iodine and glycerine (equal parts).

Some of the trials included one treatment only. Other trials included redraining the sinus 2 days after the original treatment and in further trials the sinuses were re-drained and re-treated after 2 days. In some birds the sinus was drained and no medicament introduced. The experiments were paired so as to check on two types of operative technique, the incision and syringe methods, which will be described later.

The results of these preliminary studies indicated that the syringe method was superior to the knife method in effecting a cure. The silver-nitrate solutions gave highly satisfactory results as measured by recovery of the sinuses. The calomel was only partially effective and the remaining medicaments proved of little value in effecting a cure. Drainage of the sinus without the addition of medicaments was of no value. Two treatments seemed to possess no advantage over 1 treatment.

In order to further check on the comparative value of the knife and syringe techniques, using 4 percent silver-nitrate solution, trials were conducted with 4 flocks (table 4). The results showed the syringe method to be superior.

Table 4—*Knife method versus syringe method in treating sinusitis with 4 percent silver-nitrate solution*

| Flock no. | Method | No. of birds | Recoveries |
|---|---|---|---|
| | | | *percent* |
| 1 | knife | 22 | 72 |
| 3 | ~~syringe~~ knife | 235 | 70 to 80* |
| 4 | knife | 22 | 81 |
| 1 | syringe | 26 | 96 |
| 2 | syringe | 18** | 88.8 |
| 3 | syringe | 150 | 85 to 95* |

*These are estimates only.
**Refers to the number of sinuses treated.

Preliminary studies indicated that there was no difference in results obtained with 8 and 4 percent silver-nitrate solutions. A limited number of trials had suggested that 2 percent solution was slightly less effective. Therefore, further trials were made in a flock in which the diesase was prevalent (table 5). Examinations to check results were made 2 to 8 weeks following treatment.

Table 5—*Comparison of the use of 4 percent and 2 percent silver-nitrate solution in treating sinusitis*

| Strength of solution | Sinuses treated | Recoveries |
|---|---|---|
| | | *percent* |
| 4 percent | 146 | 91.8 |
| 2 percent | 106 | 90.6 |

There were slight but not significant differences in the curative properties of the 2 percent and 4 percent solutions. However, since several trials have shown slightly better results with 4 percent strength it is probably the preferable strength to use. It is well to state here that the sinuses listed in this trial as non-recoveries were frequently improved over their former status but not sufficiently so to be termed cured.

Milks[7] states that silver-nitrate is used as a stimulant to inflamed mucous membranes and ulcers in a 2 to 8 percent solution or in stick form as lunar caustic.

In treating corneal ulcers it is used in antiseptic strength and followed by daily application of a 1 percent solution. The silver-nitrate solutions used in this study were sufficiently strong to have a caustic or irritant effect on the sinuses and head passages. Examination of several birds 1 month following treatment showed most of the mucous membrane in the sinuses to be destroyed. This was especially evident along the floor of the sinus cavity. The curative effect of silver-nitrate solution, then, may function in two ways: First, by actually destroying the diseased mucous membrane, replacing it with fibrous tissue; and second, by its toxic or antiseptic action on the causative infective agent. Since the caustic action of silver nitrate is always superficial there apparently is no danger of it destroying the deeper tissues of the face.

## Technique of Operations Using Silver-Nitrate Solutions

*Knife technique*—This includes incising the swollen sinus at its anterior ventral border, making a cut about three-eighths inch long with a sharp pointed knife and with the fingers forcing the exudate

[7]Milks, Howard Jay. Practical veterinary pharmacology, materia medica and therapeutics. 3d ed. Chicago, Alexander Eger, 1936.

from the sinus. The solution is then placed in the cavity by means of a medicine dropper. An amount equalling 15 to 20 drops is sufficient. The head is held in a tilted position and the outer sinus wall gently massaged so that the solution reaches all parts of the cavity. In case the bleeding is pronounced the sinus will have to be packed with cotton which can be removed in a few hours.

*Syringe technique*—Since this is the preferred method it will be described in more detail than the knife method.

The equipment necessary for treatment consists of a barrel or table on which to rest the turkey; a glass of distilled water in which to occasionally rinse and cleanse the syringe used to inject the silver-nitrate solution; a towel, soap, and water for cleansing the hands; some

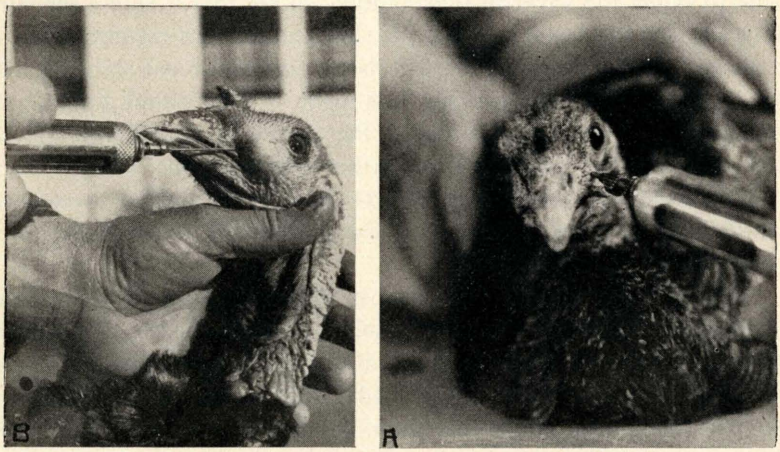


Fig. 1—B. Inserting needle into sinus preparatory to removal of exudate. A. Sinus after exudate has been drawn into syringe

absorbent cotton for cleansing the heads of birds becoming smeared with exudate; a container into which the exudate removed from the sinus can be placed; a 10 to 20 cc. hypodermic syringe (Champion) and a 16 guage needle $1\frac{1}{2}$ inches in length with which to remove the exudate; another hypodermic syringe, 10 cc. capacity and equipped with 18 guage needle, $1\frac{1}{2}$ inches long, with which to inject the silver-nitrate solution. The bird is restrained on the table or barrel by an assistant. The legs and wing tips are grasped in one hand. The other hand and arm are used to restrain the body and neck. The operator faces the bird, grasps the head in one hand and with the other introduces the needle into the swollen sinus at its lower-anterior border (see illustration). Since the skin covering the sinus is exceedingly tough it is

necessary that a sharp needle be used. It is usually necessary to resharpen new needles so that the point has two cutting edges before it will operate satisfactorily.

The needle should be kept at the extreme bottom of the sinus cavity so that all of the mucus can be withdrawn. Avoid injuring the mucous membrane lining the sinus with the needle during any struggle the bird may make. The needle is withdrawn and the exudate is emptied from the syringe into a receptical in which has been placed a disinfectant solution. Various creosote preparations or lysol solutions are satisfactory for this purpose. The needle attached to the syringe containing the silver nitrate is now introduced into the sinus through the same hole made by the previous needle which was slightly larger.

Considerable caution must be exercised, when introducing the needle to inject the silver-nitrate solution, to see that it enters the sinus cavity and not the space between the skin and mucous membrane lining the sinus. Extensive sloughing of tissue and continued sinusitis have been observed when this mistake was made. After about 1 cc. of the silver-nitrate solution is introduced the needle is withdrawn and the sinus wall is gently massaged to further distribute the solution to all parts of the cavity. No harmful effects result when some of the solution eventually finds its way into the nasal cleft in the roof of the mouth or into the eye membranes.

The operator should wear rubber gloves because of the irritant and staining action of the nitrate solution on the skin. In catching the turkeys it is well not to hold or carry them head downward for any appreciable period because those birds with crops full of water and feed will sometimes release that fluid, inhale a portion of it, and suffocate in a few seconds.

Since silver-nitrate solution oxidizes in the light it should be kept and dispensed in amber or blue bottles. It should be kept in a dark place and solution should not be prepared for longer than 1 month prior to use. Distilled water must be used in preparing the solutions since water from other sources often contains sufficient chlorides to form the insoluable silver chlorides.

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